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US Abortion Bans and Infant Mortality

Alison Gemmill, PhD; Alexander M. Franks, PhD; Selena Anjur-Dietrich, PhD; Amy Ozinsky, BS; David Arbour, PhD; Elizabeth A. Stuart, PhD; Eli Ben-Michael, PhD; Avi Feller, PhD; Suzanne O. Bell, PhD

IMPORTANCE The impact of recent abortion bans on infant mortality is not fully understood. There is also limited evidence on how these bans may interact with long-standing racial and ethnic disparities in infant health.

OBJECTIVE To examine the association of abortion bans with changes in infant mortality and to compare this association in racial and ethnic groups based on analyses within and across states.

DESIGN, SETTING, AND PARTICIPANTS This population-based, serial, cross-sectional study used a bayesian panel model to examine infant mortality rates in 14 states that implemented complete or 6-week abortion bans and compared them with predictions of infant mortality rates based on pre-ban mortality rates and states without bans. Data included all live births and infant deaths from all 50 US states and the District of Columbia for 2012 through 2023. Models accounted for temporal trends and state-specific factors, with analyses stratified by race and ethnicity, timing of death, and cause of death.

EXPOSURE Complete or 6-week abortion bans.

MAIN OUTCOME AND MEASURES Infant mortality rate, analyzed overall and by subgroups.

RESULTS The analysis found higher than expected infant mortality in states after adoption of abortion bans (observed vs expected, 6.26 vs 5.93 per 1000 live births; absolute increase, 0.33 [95% credible interval (CrI), 0.14-0.51]; relative increase, 5.60% [95% CrI, 2.43%-8.73%]). This resulted in an estimated 478 excess infant deaths in the 14 states with bans during the months affected by bans. The estimated increases were higher among non-Hispanic Black infants compared with other racial and ethnic groups, with 11.81 observed vs 10.66 expected infant deaths per 1000 live births, an absolute increase of 1.15 (95% CrI, 0.53-1.81) and relative increase of 10.98% (95% CrI, 4.87%-17.89%). The observed infant mortality rate due to congenital anomalies was 1.37 vs 1.24 expected (absolute increase, 0.13 [95% CrI, 0.04-0.21]; relative increase, 10.87% [95% CrI, 3.39%-18.08%]), while the rate not due to congenital anomalies was 4.89 observed vs 4.69 expected (absolute increase, 0.20 [95% CrI, 0.02-0.38]; relative increase, 4.23% [95% CrI, 0.49%-8.23%]). Texas had a dominant influence on the overall results and there were larger increases in southern vs nonsouthern states.

CONCLUSIONS US states that adopted abortion bans had higher than expected infant mortality after the bans took effect. The estimated relative increases in infant mortality were larger for deaths with congenital causes and among groups that had higher than average infant mortality rates at baseline, including Black infants and those in southern states.

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Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Alison Gemmill, PhD, Department of Population, Family and Reproductive Health, Johns Hopkins Bloomberg School of Public Health, 615 N Wolfe St, Baltimore, MD 21205 (agemmill@jhu.edu).

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Laws on abortion in the US have changed dramatically since 2021. Texas Senate Bill 8 banned abortion after approximately 6 weeks' gestation in September 2021, and the following June, the Supreme Court's *Dobbs v Jackson Women's Health Organization* decision returned the authority to regulate abortion to the states. As of November 2024, 13 states banned abortion completely and 4 more restricted it after 6 weeks' gestation,[1] with evidence of 2% to 3% increases in live births above expectation in states that banned abortion.[2,3] The unprecedented nature of these policies in the US raises important questions about their potential impact on pregnancy-related health outcomes, including infant mortality, particularly in the 6 states with no exceptions for the health of the pregnant individual and the 13 states with no exceptions for fatal fetal anomalies.[4]

In the US, infant mortality (ie, death before age 1 year) has generally been declining, with 5.6 infant deaths per 1000 live births in 2022 (down from 6.9 in 2000).[5] Abortion bans have the potential to counteract this progress, as they may increase infant deaths through the continuation of pregnancies with congenital malformations, the leading cause of infant mortality in the US.[5,6] These bans could also increase infant mortality by limiting access to high-risk pregnancy care,[7,8] which could in turn exacerbate maternal complications that are linked to adverse infant outcomes.[9,10] Additionally, abortion bans could exacerbate disparities in infant mortality because persons who are unable to overcome barriers to abortion access are often from the same groups that experience higher rates of infant mortality.[5,11,12]

Research on prior, less severe abortion restrictions in the US has suggested an association between abortion regulations and infant death,[13-16] yet only 3 studies have examined the association of recent abortion bans with infant mortality.[17-19] Two studies estimated a 6% to 13% increase in infant mortality above expectation following the imposition of Texas Senate Bill 8,[17,18] while another study showed a 7% increase in infant mortality nationwide following the *Dobbs* decision,[19] with the predominant cause from all 3 studies being death associated with congenital malformations. One study also found a disproportionate impact among non-Hispanic Black infants, suggesting these bans may harm health equity.[18] These findings confirmed earlier predictions and modeling studies on the health consequences of restrictive abortion laws.[6,20] They also aligned with highly publicized anecdotes and court cases from the state of Texas highlighting the experience of pregnant individuals being denied medically indicated terminations or terminations of pregnancies diagnosed with severe anomalies incompatible with life.[21]

It remains unclear how infant mortality changed in states with abortion bans—other than Texas—many of which implemented even more restrictive policies following the *Dobbs* decision. The previous study examining national-level changes after *Dobbs* did not analyze states with abortion bans separately, nor use a comparison group, making the results susceptible to influences from other contemporaneous factors. This study addressed these gaps by examining the association of abortion bans with changes in infant mortality and comparing this association in racial and ethnic groups based on analyses within and across states.

Key Points

Question Was the adoption of complete or 6-week abortion bans associated with changes in infant mortality rates?

Findings This analysis of US national vital statistics data from 2012 through 2023 found higher than expected infant mortality in states after adoption of abortion bans (observed vs expected, 6.26 vs 5.93 per 1000 live births; relative increase, 5.60%). Estimated increases were relatively larger among infants who were Black, had congenital anomalies, or were born in southern states.

Meaning Abortion bans were associated with increases in infant mortality. These increases were larger for populations that already experienced higher than average rates of infant mortality.

Methods

Data

Study data included biannual (eg, January-June) counts of neonatal (aged <28 days) and infant (aged <1 year) deaths, as well as the corresponding total number of live births, from birth and death certificate data compiled by the National Center for Health Statistics for all 50 US states and the District of Columbia (hereafter, *states*) from January 2012 through December 2023. Biannual counts of infant deaths and live births were separately extracted for 4 racial and ethnic groups (racial and ethnic data were obtained from the death certificate, which is identified by the next of kin, coroner, or other person who certified the death) for each state over the same period: Hispanic, non-Hispanic Black, non-Hispanic White, and other racial and ethnic categories. Additionally, biannual counts of the number of infant deaths due to congenital anomalies and deaths due to all other causes were obtained. All data were accessed via the US Centers for Disease Control and Prevention (CDC) WONDER online platform.[22] The Johns Hopkins Bloomberg School of Public Health institutional review board determined this study was exempt from ethical review (#27567).

Exposure and Outcomes

The primary outcome was the infant mortality rate, calculated as the number of infant deaths per 1000 live births in each biannual period for each state over 12 years (N = 1224 observations). Mortality rates were calculated overall and by race and ethnicity, timing of death (neonatal vs not), and cause of death (congenital vs not). For stratified analysis by race and ethnicity, the denominator was the number of live births in that racial or ethnic group; the denominator for all other analyses was the total number of live births.

The exposure was the imposition of a complete or 6-week abortion ban. This includes 14 states that imposed a ban between September 1, 2021 (Texas), and August 25, 2022 (see eAppendix p 2 in Supplement 1 for details on policy exposure): Alabama, Arkansas, Georgia, Idaho, Kentucky, Louisiana, Mississippi, Missouri, Oklahoma, South Dakota, Tennessee,

West Virginia, and Wisconsin (all states but Idaho, Missouri, South Dakota, and Wisconsin considered southern states). States that banned abortion more recently were not considered exposed, as insufficient time had elapsed to observe birth cohorts exposed to the ban in the study period. Month of death was used to classify exposure in states with bans, with the first exposed biannual period being January through June 2022 for Texas and January through June 2023 for all other states.

Analysis

Analyses used a bayesian panel data model to examine infant mortality rates in 14 states that implemented complete or 6-week abortion bans and compared them with counterfactual predictions of infant mortality rates based on pre-ban mortality rates and states without bans. This is similar to the analysis used by Bell et al to model the association between abortion bans and fertility rates.[3] Because of Texas' large number of infant deaths and the earlier imposition of its ban, estimates are presented separately for all states with bans, all states with bans excluding Texas, and Texas. The details of the methodological approach can be found in the eAppendix (pp. 5-13) in Supplement 1.

Modeling state- and subcategory-level infant mortality is challenging. Prepolicy infant mortality patterns—including long-term declines, potential for nonparallel trends between states that banned and did not ban abortion, and increases due to the COVID-19 pandemic—underscore the need for statistical models that incorporate both secular trends and population shocks.[5,23,24] Further complications arose due to the relatively small number of infant deaths per state-period (the median banned state had approximately 150 infant deaths total in a biannual period) (eAppendix Table B.2 in Supplement 1) and the relatively high percentage of missing observations in some states and subgroups (eAppendix Table B.1 in Supplement 1).

Two-way fixed effects and other variations on the classic difference-in-differences framework are the most common approaches for this type of panel data.[25] However, two-way fixed effects rely on a parallel trends assumption that is unlikely to hold in this data series. The method in this article avoids that restriction, instead assuming that observed outcomes depend on a small number of unobserved factors, known as a low-rank factor model. This approach also accommodates count outcomes by modeling infant deaths in each state-period as Poisson distributed, with a mean rate scaled by the number of observed live births (the offset). For states with abortion bans in exposed time periods, the expected infant mortality rate in the absence of the exposure is the model prediction based largely on observed infant mortality both for states without abortion bans during the entire study period and for states with abortion bans prior to the exposure period. To handle states and subcategories with small counts, the model partially pools the estimated changes toward the null of no difference via a hierarchical model, which differentially shrinks the unadjusted expected differences across states, subcategories, and time.

Missing Data

In publicly available vital statistics data obtained via CDC WONDER, cells with counts between 1 and 9 are suppressed. Although there are no missing counts for total infant deaths, a meaningful fraction of observations was missing in smaller states for the smaller subcategories (eAppendix Table B.1 in Supplement 1). The bayesian framework modeled these missing observations by incorporating the appropriate likelihood in the model.

Estimation

This model was separately estimated for all categories (total deaths, deaths by race and ethnicity, timing of death, and cause of death); within each category, all states and subcategories were jointly modeled. The model was implemented in the probabilistic programming language NumPyro.[26] The Markov chain Monte Carlo algorithm was run for 10 000 iterations split across 4 chains; all convergence diagnostics showed appropriate mixing and effective sample sizes for key parameters. Model implementation and fitting were performed using Python version 3.11. All plots and model summaries were generated using R version 4.3.0 (R Foundation).

Additional Sensitivity Checks

A placebo-in-time analysis for the overall infant mortality rate was conducted by shifting the start of the exposure date 2 years earlier for each state to examine whether the results could be explained by factors other than the abortion bans. To assess the potential role of concurrent changes in states without bans in response to the abortion bans in explaining study results, analyses were run excluding states without bans that had an absolute change in the estimated resident abortion rate of 2 or more abortions per 1000 individuals aged 15 to 44 years with childbearing capacity between 2020 and 2023 or that experienced a surge in abortions following the *Dobbs* decision.[27,28]

Post Hoc Calculation

Using results from Bell et al,[3] the correlation between estimated state-level changes in the fertility rate associated with abortion bans and the state-level changes in the infant mortality rate from the current study was calculated. The infant mortality rate among the excess births associated with these abortion bans was also calculated using the estimated number of excess deaths from the current study and the estimated number of excess births from Bell et al.[3]

Results

The **Table** presents descriptive characteristics of infant deaths during the study period. **Figure 1** displays smoothed trends in relative infant mortality rates from 2012 through 2023 for states without bans, states with bans excluding Texas, and Texas. Before the COVID-19 pandemic, infant mortality in the US was trending downward, but this pattern reversed during the pandemic, particularly in early 2021.

Figure 2 shows corresponding model results. States that implemented a 6-week or complete abortion ban had an estimated 0.33 (95% credible interval [CrI], 0.14-0.51) additional infant deaths per 1000 live births above the expected rate of 5.93 (observed, 6.26), or a relative 5.60% (95% CrI, 2.43%-8.73%)

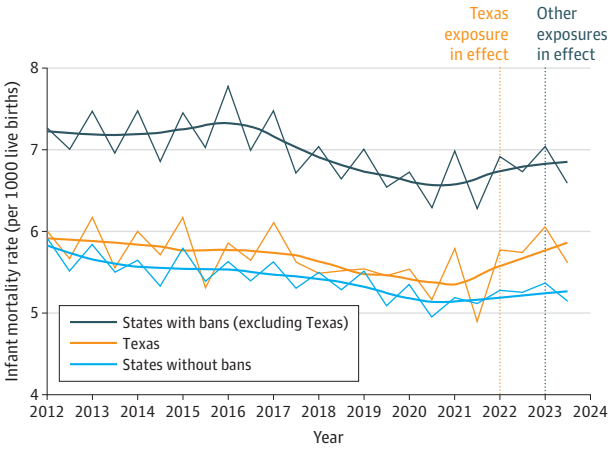
Table. Characteristics of US Infant Deaths for States With Abortion Bans and States Without Bans, by Exposure Period

	No. (%)			
	States with bans		States without bans	
	Pre-ban (2012-2022)	Under ban (2023)[a]	Pre-ban (2012-2022)	Under ban (2023)[a]
Total	75 354 (100.0)	9045 (100.0)	164 081 (100.0)	13 343 (100.0)
Infant race and ethnicity[b]				
Hispanic	13 704 (18.2)	2475 (27.4)	36 649 (22.3)	3510 (26.3)
Non-Hispanic Black	25 234 (33.5)	2715 (30.0)	45 200 (27.5)	3341 (25.0)
Non-Hispanic White	33 199 (44.1)	3284 (36.3)	69 519 (42.4)	5043 (37.8)
Other	3217 (4.3)	571 (6.3)	12 712 (7.7)	1449 (10.9)
Infant cause of death				
Congenital malformations	15 967 (21.2)	1975 (21.8)	32 898 (20.0)	2580 (19.3)
Disorders related to short gestation or low birth weight	12 121 (16.1)	1258 (13.9)	28 011 (17.1)	1965 (14.7)
Sudden infant death syndrome	6212 (8.2)	767 (8.5)	9777 (6.0)	890 (6.7)
Complications of pregnancy	3659 (4.9)	405 (4.5)	11 303 (6.9)	853 (6.4)
Unintentional injuries	4814 (6.4)	608 (6.7)	8680 (5.3)	804 (6.0)
Other	32 581 (43.2)	4032 (44.6)	73 412 (44.7)	6251 (46.8)
Timing of infant death				
Neonatal	47 377 (62.9)	5658 (62.6)	111 222 (67.8)	8855 (66.4)
Postneonatal	27 977 (37.1)	3387 (37.4)	52 859 (32.2)	4488 (33.6)

[a] Texas' period under ban includes 2022 and 2023; all other states' ban period only includes 2023.

[b] Infant racial and ethnic data were obtained from death certificates; identified by the next of kin, coroner, or other person who certified the death.

Figure 1. Trends in Biannual US Infant Mortality Rates, 2012-2023



Infant mortality was measured as deaths of infants younger than 1 year per 1000 live births. Jagged lines show biannual infant mortality rates. Solid lines show smoothed infant mortality rates (locally estimated scatterplot smoothing with a span of 0.5). Vertical dotted lines represent when abortion ban exposures began in Texas and in other states. Texas imposed a 6-week abortion ban the year prior to other states' bans; thus, its trendline is presented separately. Data are from birth and death certificates for all 50 US states and the District of Columbia obtained via the US Centers for Disease Control and Prevention's WONDER database.

increase in the infant mortality rate above expectation. This amounted to an estimated 478 (95% CrI, 209-735) excess infant deaths. Excluding Texas, which enacted an abortion ban nearly 1 year ahead of other states, there was an estimated increase of 0.14 (95% CrI, −0.09 to 0.41) infant deaths per 1000 live births (6.80 observed vs 6.66 expected), or 94 (95% CrI, −63 to 272) excess infant deaths (**Figure 3**).

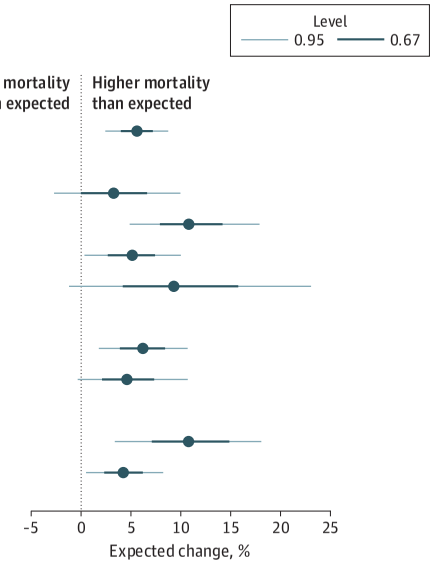
State-specific estimated relative changes in infant mortality ranged from a −3.1% to 9.4% difference from expectation (corresponding absolute rate difference, −0.22 to 0.49), although the 95% CIs included 0 for all states except Texas (Figure 3). The largest estimated changes were in Texas (0.49 [95% CrI, 0.25-0.72]; 5.79 observed vs 5.30 expected) and Kentucky (0.49 [95% CrI, −0.05 to 1.16]; 6.60 observed vs 6.11 expected). Changes were concentrated in the South, with a posterior probability of differences between southern vs non-southern states of 0.99.

The estimated increase in mortality was larger for Black infants compared with all other racial and ethnic groups (posterior probability of subgroup difference = 0.96) (Figure 3). Among all states with bans, Black infants died at a rate 10.98% (95% CrI, 4.87%-17.89%) higher than would be expected in the absence of state abortion bans, equivalent to 265 (95% CrI, 122-415) excess infant deaths, or 1.15 (95% CrI, 0.53-1.81) additional infant deaths per 1000 live births above the expected rate of 10.66 (observed, 11.81). State-specific estimates of the difference in Black infant mortality associated with abortion bans ranged from a 0.19 (Idaho) to a 1.98 (Kentucky) increase above expectation, with 95% CIs excluding 0 in 2 states (eAppendix Section E.3 in Supplement 1).

Estimated differences between the observed and expected infant mortality rate by age at death show similar increases for neonatal (0.23 [95% CrI, 0.07-0.38]; 3.91 observed vs 3.68 expected) and non-neonatal deaths (0.11 [95% CrI, −0.01 to 0.23]; 2.34 observed vs 2.23 expected), equivalent to a 6.2% and 4.8% increase, respectively (Figure 2). The infant mortality rate due to congenital anomalies increased to 1.37 observed vs 1.24 expected (10.87% relative increase [95% CrI, 3.39%-18.08%]), while the rate not due to congenital anomalies increased to 4.89 observed vs 4.69 expected (4.23% relative

Figure 2. Estimated Difference in Cumulative Observed vs Expected Infant Deaths in All US States With Abortion Bans in Months Affected by Bans

	Births, No.	Infant deaths, No.			Infant mortality rate (per 1000 live births)			
		Observed	Expected	Expected difference, No. (95% CrI)	Observed	Expected	Expected difference, No. (95% CrI)	Expected change, % (95% CrI)
Total[a]	1445 309	9045	8567	478 (209 to 735)	6.26	5.93	0.33 (0.14 to 0.51)	5.60 (2.43 to 8.73)
Race and ethnicity[b]								
Hispanic	468412	2475	2397	78 (-67 to 229)	5.28	5.11	0.17 (-0.14 to 0.49)	3.30 (-2.71 to 9.95)
Non-Hispanic Black[a]	229808	2715	2450	265 (122 to 415)	11.81	10.66	1.15 (0.53 to 1.81)	10.98 (4.87 to 17.89)
Non-Hispanic White[a]	641196	3284	3126	158 (11 to 306)	5.12	4.87	0.25 (0.02 to 0.48)	5.08 (0.35 to 9.98)
Other	105893	548	503	45 (-6 to 102)	5.18	4.75	0.43 (-0.06 to 0.96)	9.89 (-1.21 to 23.06)
Timing of death								
Neonatal[a]	1445 309	5658	5330	328 (97 to 555)	3.91	3.68	0.23 (0.07 to 0.38)	6.20 (1.78 to 10.68)
Non-neonatal	1445 309	3387	3235	152 (-11 to 331)	2.34	2.23	0.11 (-0.01 to 0.23)	4.75 (-0.34 to 10.68)
Cause of death								
Congenital[a]	1445 309	1975	1784	191 (62 to 308)	1.37	1.24	0.13 (0.04 to 0.21)	10.87 (3.39 to 18.08)
Noncongenital[a]	1445 309	7070	6785	285 (34 to 547)	4.89	4.69	0.20 (0.02 to 0.38)	4.23 (0.49 to 8.23)



CrI indicates credible interval.

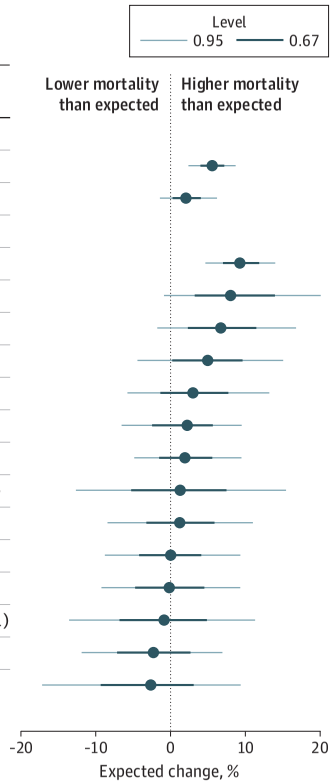
Infant mortality was measured as deaths of infants younger than 1 year; neonatal mortality was measured as deaths at younger than 28 days. Congenital malformations are structural or functional anomalies that occur before birth and were identified as the cause of death via *International Statistical Classification of Diseases and Related Health Problems 10th Revision* (*ICD-10*) codes Q00-Q99. Expected differences were computed using a bayesian hierarchical panel data model and compared observed data with counterfactual predictions of infant mortality rates based on pre-ban mortality rates for states with bans and on mortality rates for the entire period for states without bans. Data are from birth and death certificates for all 50 US states and the District of Columbia obtained via the US Centers for Disease Control and Prevention's WONDER database.

[a]Indicates 95% CrI excludes 0.

[b]Racial and ethnic data were obtained from death certificates; identified by the next of kin, coroner, or other person who certified the death.

Figure 3. Estimated Difference in Cumulative Observed vs Expected Infant Deaths Overall in US States With Abortion Bans, US States With Abortion Bans Excluding Texas, and Individual States in Months Affected by Bans

	Births, No.	Infant deaths, No.			Infant mortality rate (per 1000 live births)			
		Observed	Expected	Expected difference, No. (95% CrI)	Observed	Expected	Expected difference, No. (95% CrI)	Expected change, % (95% CrI)
Aggregated								
States with bans[a]	1 445 309	9045	8567	478 (209 to 735)	6.26	5.93	0.33 (0.14 to 0.51)	5.60 (2.43 to 8.73)
States with bans (excluding Texas)	667 623	4543	4449	94 (-63 to 272)	6.80	6.66	0.14 (-0.09 to 0.41)	2.12 (-1.41 to 6.22)
States with bans								
Texas[a]	777 686	4502	4118	384 (198 to 558)	5.79	5.30	0.49 (0.25 to 0.72)	9.41 (4.65 to 13.99)
Kentucky	51984	343	317	26 (-3 to 60)	6.60	6.11	0.49 (-0.05 to 1.16)	8.57 (-0.89 to 20.11)
Alabama	57858	445	417	28 (-7 to 66)	7.69	7.21	0.48 (-0.12 to 1.15)	6.93 (-1.77 to 16.81)
Oklahoma	47909	337	321	16 (-14 to 46)	7.03	6.70	0.33 (-0.30 to 0.97)	5.01 (-4.43 to 15.07)
Arkansas	35264	294	285	9 (-17 to 36)	8.34	8.09	0.25 (-0.48 to 1.03)	3.22 (-5.75 to 13.20)
Georgia	125 120	874	857	17 (-44 to 79)	6.99	6.86	0.13 (-0.35 to 0.63)	2.01 (-4.86 to 9.47)
Tennessee	83021	542	532	10 (-35 to 50)	6.53	6.41	0.12 (-0.43 to 0.60)	1.87 (-6.54 to 9.53)
South Dakota	11201	71	70	1 (-10 to 11)	6.34	6.26	0.08 (-0.86 to 0.96)	1.34 (-12.64 to 15.46)
Mississippi	34459	305	301	4 (-26 to 33)	8.85	8.74	0.11 (-0.75 to 0.96)	1.31 (-8.45 to 11.01)
Louisiana	54927	396	396	0 (-37 to 37)	7.21	7.22	-0.01 (-0.67 to 0.67)	-0.01 (-8.78 to 9.34)
Wisconsin	59754	348	349	-1 (-33 to 32)	5.82	5.83	-0.01 (-0.55 to 0.54)	-0.11 (-9.25 to 9.33)
Idaho	22397	100	101	-1 (-15 to 11)	4.46	4.51	-0.05 (-0.68 to 0.50)	-0.94 (-13.58 to 11.31)
Missouri	67123	392	402	-10 (-51 to 27)	5.84	5.98	-0.14 (-0.76 to 0.41)	-2.26 (-11.88 to 6.95)
West Virginia	16606	96	100	-4 (-20 to 10)	5.78	6.00	-0.22 (-1.20 to 0.61)	-3.09 (-17.18 to 9.38)



CrI indicates credible interval.

Infant mortality was measured as deaths of infants younger than 1 year; neonatal mortality was measured as deaths at younger than 28 days. Congenital malformations are structural or functional anomalies that occur before birth and were identified as the cause of death via *International Statistical Classification of Diseases and Related Health Problems 10th Revision* (*ICD-10*) codes Q00-Q99. Expected differences were computed using a bayesian hierarchical panel data model and compared observed data with counterfactual predictions of infant mortality rates based on pre-ban mortality rates for states with bans and on mortality rates for the entire period for states without bans. Data are from birth and death certificates for all 50 US states and the District of Columbia obtained via the US Centers for Disease Control and Prevention's WONDER database.

[a]Indicates 95% CrI excludes 0.

increase [95% CrI, 0.49%-8.23%]) (posterior probability of subgroup differences = 0.95) (Figure 2).

In the post hoc analysis, estimated state-level changes in the mortality rate correlated with state-level estimates of the change in fertility rate due to abortion bans reported in Bell et al[3] (correlation = 0.77; P = .001). Using the estimated 478 total excess deaths from the current analysis and the estimated 22 180 total excess births from Bell et al,[3] the resulting infant mortality rate was 24 infant deaths per 1000 live births under the assumption that the excess deaths associated with abortion bans were concentrated among those who would have received an abortion but could not.

Results from the placebo-in-time sensitivity analysis show no overall change in infant mortality among states with bans during the earlier period, with expected levels of variability in state-specific placebo estimates (eAppendix pp. 52-53 in Supplement 1). The sensitivity results from analyses excluding states without bans that likely experienced the greatest changes in abortion service delivery and use among residents post-*Dobbs* are similar to the primary analysis, although slightly attenuated, suggesting that potential changes in states without bans are not key drivers of the estimates.

Discussion

This study found that states that banned abortion had infant mortality rates higher than would have been expected without such bans. The largest estimated changes were observed among southern states and Black infants. Although the estimated changes in overall infant mortality rates were positive in most states, the 95% CrI excluded 0 only in Texas. Texas had an outsized influence on the overall results likely due, in part, to its larger size and duration of policy exposure, as well as a greater increase in driving distance to the nearest abortion facility compared with other states with bans.[2,29]

This analysis found an estimated increase of 0.33 infant deaths per 1000 live births (from 5.93 to 6.26 per 1000 [5.6% increase]) above expected in states that banned abortion, with variation in magnitude and CrI inclusion of 0 across states. This increase is somewhat lower than findings from prior research.[17-19] The current study's Texas-specific estimate is in line with the previous studies' results, and the current study's results suggest that states that banned abortion following *Dobbs* experienced a smaller increase than Texas. The variability in state-level results may be explained, at least in part, by distance to abortion providers.[2] These results also align with related lines of inquiry demonstrating increases in poor pregnancy-related outcomes associated with state-level abortion restrictions.[30,31]

A parallel study, which shows an increase in fertility rates in states that banned abortion, helps shed light on this increase in infant mortality. Evidence suggests that increases in the fertility rate due to abortion bans were especially large among people who experienced structural disadvantage, including racially minoritized individuals, those without a college degree, and individuals using public health insurance[3]—all groups with higher infant mortality rates.[5,32,33] Commensurate with this, the estimated state-level changes in the mortality rate correlate with state-level estimates of the change in fertility rate due to abortion bans reported in the study by Bell et al.[3] Based on the post hoc calculation, the estimated infant mortality rate among the excess births associated with abortion bans was nearly 4 times higher than the overall average infant mortality rate in states with bans as of 2019. This comparison suggests abortion bans are associated with excess births that shift the composition of births toward those at higher risk of infant death.

This analysis indicated that the largest change associated with these bans was among Black infants, who were already more than twice as likely to die in the first year compared with their White and Hispanic counterparts.[5] Furthermore, Black individuals had the greatest potential to be impacted by abortion bans, as they had higher unintended pregnancy and abortion rates prior to *Dobbs* and fewer resources to travel out of state.[12,34,35] This study's results suggest that abortion bans may exacerbate racial disparities and disproportionately affect communities in southern states, where more than half of the US Black population resides and infant mortality was already high.[12,36]

This analysis found higher-than-expected infant mortality due to both congenital and noncongenital causes. An increase in the mortality rate of infants with congenital malformations as the reported cause of death is likely due to continuation of pregnancies with nonviable fetuses that might not have continued in the absence of abortion bans. The results are consistent with clinician and media reports documenting denial of terminations for nonviable pregnancies, forcing pregnant individuals to overcome substantial barriers to receive timely abortion care out of state or carry the pregnancy to term.[7,21] The increase in infant mortality rate due to noncongenital causes is less straightforward and warrants further investigation. One possibility is that these increases may result from the disproportionate impact of abortion bans on already disadvantaged populations, who are at higher risk of infant mortality, or from delays in receiving timely medical interventions.[5,7,8] These results indicate that legal exceptions based solely on fetal anomalies will not fully offset the negative effects of abortion bans on infant health.

This study has several strengths. It used panel data on infant deaths for the entire US. The policy changes in states that imposed abortion bans were discrete and extreme, and this analysis used robust causal inference techniques. The imputation techniques used for missing data helped address limitations in the current publicly available data, which suppress death counts between 1 and 9. This enabled the analysis to examine heterogeneity in the impact of these bans on infant mortality by race, which prior studies on similarly severe bans were unable to do.

Limitations

This study has limitations. First, modeling state- and category-level variation in infant mortality while mitigating the influence of other contemporaneous factors is inherently challenging. One such factor is the COVID-19 pandemic, which has been linked to increased adverse perinatal outcomes, including

infant mortality.[24,37] Incorporating comparison states partly accounts for the pandemic's lingering effects.

Second, because infant mortality is a rare outcome, the small number of infant deaths for each state-period subcategory limits statistical power. Relatedly, many of the state-period observations were suppressed to protect confidentiality, requiring imputation to avoid excluding states with missing information. Third, examination of parental characteristics beyond race and ethnicity or potential changes in fetal deaths was not possible due to the lack of available data. Fourth, information on gestational age at birth and age at death were not available in the data, which introduced the potential for misclassification of exposure. Fifth, 2023 infant mortality data were still considered provisional. Future research can address these limitations when individual-level linked birth-infant death and fetal death files for 2023 become available. Sixth, further disaggregation of the "other" racial and ethnic category was not feasible due to small cell sizes, obscuring potential impacts on smaller populations, such as American Indian and Alaska Native infants, who have the second-highest mortality rate.[5] Seventh, investigating specific noncongenital causes of death (eg, parental complications or unintentional injuries) was not possible because of the small number of cases in each cause-specific group.

Conclusions

Using population-based data, this study provides new evidence that infant deaths were higher than expected in states that imposed abortion bans after the bans took effect. The estimated relative increases in infant mortality were larger for deaths due to congenital causes and among groups that had higher than average infant mortality rates at baseline, including Black infants and those in southern states.

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Author Affiliations: Department of Population, Family and Reproductive Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland (Gemmill, Anjur-Dietrich, Ozinsky, Bell); Department of Statistics and Applied Probability, University of California, Santa Barbara (Franks); Adobe Research, San Jose, California (Arbour); Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland (Stuart); Heinz College of Information Systems and Public Policy, Department of Statistics & Data Science, Carnegie Mellon University, Pittsburgh, Pennsylvania (Ben-Michael); Goldman School of Public Policy, Department of Statistics, University of California, Berkeley (Feller).

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